6. (Amended) [Apparatus according to any one of claims 4-5] The apparatus of claim 4, wherein the primary cyclone vessel and the stripping zone together form one tubular vessel, wherein in use, all of the stripping gas will be discharged from the stripping zone via the primary cyclone to the gas outlet conduit of the primary cyclone.

7. (Amended) [Apparatus according to any one of claims 4-5] The apparatus of claim 4, wherein the primary cyclone, secondary cyclone(s) and the stripping zone are located in a reactor vessel having a larger diameter than the primary cyclone, wherein [the] said reactor vessel is also provided with means to supply the suspension of catalytic particles and [vapour] vapor and means to discharge stripped catalyst and [vapours] vapors essentially free of catalyst particles.

8. (Amended) [Apparatus according any one of claims 1-3] The apparatus of claim 1, wherein a dipleg is present at the lower end of the tubular wall section of the primary cyclone, [which] said dipleg is fluidly connected to the tubular wall section by means of a frusto conical wall section.

9. (Amended) [Fluidized] The fluidized catalytic cracking reactor vessel comprising an apparatus according to claim 8, wherein a downstream end of a reactor riser is in fluid communication with the tangentially arranged inlet of the primary cyclone, the vessel further comprising at its lower end a stripping zone provided with means to supply a stripping medium to a dense fluidized bed of separated catalyst particles, means to discharge stripped catalyst particles from the vessel and means to discharge the hydrocarbon and stripping medium [vapours] vapors from the vessel.

10. (Amended) [Vessel according to] The vessel of claim 9, wherein the gas outlet conduit of the primary cyclone is provided with an opening to receive stripping medium and stripped hydrocarbons.

11. (Amended) [Use] The use of an apparatus of claim 1 to separate solid particles from a suspension of particles and gas.

12. (Amended) [Use according to] The use of claim 11, wherein the separation is part of a fluid catalytic cracking process.

13. (Once Amended) [Use according to] The use of claim 12, wherein a gas solids suspension if fed to the primary cyclone having a solids content [of] between about 0.5 and 15 kg/m^3.

GAS-SOLID SEPARATION PROCESS

Field of the invention

The invention is directed to an improved separation apparatus, wherein particles can be efficiently separated from a gas-particles mixture. The invention is also directed to the use of such an apparatus in a fluid catalytic cracking process.

Background of the invention

The field of fluid catalytic cracking (FCC) has undergone significant development improvements due primarily to advances in catalyst technology and product distribution obtained therefrom. With the advent of high activity catalysts and particularly crystalline zeolite cracking catalysts, new areas of operating technology have been encountered requiring even further refinements in processing techniques to take advantage of the high catalyst activity, selectivity and operating sensitivity. Of particular concern in this field has been the development of methods and systems for separating the hydrocarbon product from the catalyst particles, particularly from a high activity crystalline zeolite cracking catalysts, under more efficient separating conditions so as to reduce the overcracking of conversion products and promote the recovery of desired products of an FCC operation. US-A-4588558, US-A-5376339, EP-A-309244, US-A-5055177 and US-A-4946656 all describe developments concerned with the rapid separation and recovery of entrained catalyst particles from the hydrocarbon products. The rapid separation is achieved in that the catalyst are separated from the reactor riser effluent in a first cyclone separator, the primary cyclone, of which gas outlet conduit is in fluid